

**MATHEMATICAL METHODS**

**UNITS 1 & 2**

**2013**

Areas of Learning

### Functions and Graphs

This area of study covers the graphical representation of functions of a single real variable and the study of key features of functions such as intercepts, domain and range of a function, asymptotic behaviour and symmetry. Treatment of non-polynomial functions is restricted to simple circular functions and simple logarithmic and exponential functions.

### Algebra

This area of study supports material in the ‘Functions and graphs’ area of study. In this unit the focus is on the algebra of simple polynomial functions such as linear, quadratic and cubic functions. The study of related algebra material in circular, logarithmic and exponential functions is also covered.

### Calculus

This area of study introduces an intuitive understanding of instantaneous rates of change through familiar situations, and through a graphical and numerical approach to the measurement of constant, average and instantaneous rates of change. It then covers the first principles approach to differentiation, formal differentiation and anti-differentiation of polynomials of degree no higher than three.

### Probability

This area of study covers introductory probability theory, including the concept of events, Venn diagrams, Karnaugh maps, tables and tree diagrams. Impossible, certain, complementary, mutually exclusive, conditional and independent events involving one, two or three events including rules for computation of compound events. It also covers the introductory counting principles and techniques and their application to probability.

Outcomes

For each unit students are required to demonstrate achievement in three outcomes. As a set these outcomes encompass all selected areas of study for each unit. For each of Unit 1 and Unit 2 the outcomes apply to the content from the areas of selected for that unit.

### Outcome 1

On completion of each unit the student should be able to define and explain key concepts as specified in the content from the above areas of study, and to apply a range of related mathematical routines and operations.

### Outcome 2

On completion of each unit the student should be able to apply mathematical processes in non-routine contexts and to analyse and discuss these applications of mathematics.

### Outcome 3

On completion of each unit the student should be able to select and appropriately use technology to develop mathematical ideas, produce results and carry out analysis in situations requiring problem-solving, modelling or investigative techniques or approaches.

Tutorials

Students undertaking units 1 and 2 mathematical methods in 2013 will be offered a weekly tutorial that will take place on Wednesday afternoons (at Maths Boost). Attendance at the tutorial is on a voluntary basis. Students who have not achieved a satisfactory outcome in their topic tests will be required to attend future tutorial sessions.

Assessment

Common assessment tasks are used throughout all classes in units 1 and 2 mathematical methods. Results from all classes are collated and ranked before grading. Assessment tasks will be a mixture of assignment and test formats. The tests will include some non-technology and no notes as well as some open book tests.

Examination

Exams are held both at the conclusion of unit 1 and the conclusion of unit 2. In each case there will be two exams. One exam is a non-technology exam of 60 minutes duration. Students are not permitted to take notes or calculators into this exam. The second exam is a 90 minute analysis paper where students are permitted to bring calculators and a single bound book into.

Promotion Policy

Students who achieve the satisfactory result of a C average across units 1 and 2 will receive automatic promotion to units 3 and 4. If a student does not receive a satisfactory outcome on an assessment task they will be asked to attend tutorials on a Wednesday afternoon.

Collaboration

Teachers of mathematical methods will collaborate on all ideas, methods and worksheets through scheduled course meetings, informal meetings, email and use of the network share drive.

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Curriculum Outline

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| --- | --- | --- | --- |
| Timeline | Course Content | Questions selected from the exercises below | Assessment |
| **1 week**  **4 Feb-8 Feb** | INTRODUCTION TO FUNCTIONS & RELATIONS |  | HW – basic hybrid function + M for maths |
|  | Set and interval notation  Domain and range  Functions and relations | 1.7 |
| **2 weeks**  **11 Feb-22 Feb** | LINEAR FUNCTIONS |  | Test:  1 period  Multiple choice and short answer  (similar to 2012 )  Analysis task:  2 weeks to hand in (as 2012) |
| Finding the gradient of a line:   * From a graph * Between two points * Using tan * From a parallel line * From a perpendicular line | 1.2 |
|  | Coordinate geometry:   * Finding the midpoint of two points * Finding the distance between two points | 1.9 | HW – Dog leg |
|  | Finding the equation of a line given:   * one point and the gradient * two points * it’s parallel to another line * it’s perpendicular to another line | 1.3 | HW - SAC application task p54 |
|  | Solving simultaneous equations:   * Using elimination * Using substitution * Graphically * Using CAS   Linear modelling: | 1.5  1.6 | HW – Tyre wear |
|  | Review | mymathsonline | HW - Chapter review |
| **1 week**  **25 Feb-1 Mar** | Review of linear functions test + holiday homework |  | Review logbook and update test answers |
| **4 weeks**  **4 Mar-29 Mar** | QUADRATIC FUNCTIONS |  | Test:  1 period  Multiple choice and short answer  HW 2.3 Q9,10, 2.5 Q6,7 |
| Expanding quadratic expressions | 2.2 |
|  | Factorising quadratic expressions:   * HCF * In pairs * By recognition or rule * Simple trinomials * Trinomials where the coeff of * DOTS | 2.3 2.4 |
|  | Solving quadratic equations (null factor law) | 2.6 | HW 2.6 Q9-11 |
|  | Solving quadratic equations by completing the square | 2.7 | HW 2.7 Q7 |
|  | Quadratic graphs – turning point form  (dilation and translation of graphs) | 2.9 2.10 | HW 2.10 Q6 |
|  | Quadratic graphs – intercepts   * Determining rules | 2.11  2.11 Q10-12 |  |
|  | The discriminant and quadratic formula | 2.8 | HW 2.8 Q9,10 |
|  | Simultaneous quadratic and linear equations | 2.13 | HW 2.13 Q7  SAC application task p106 |
|  | Using graphs to solve quadratic equations | 2.12 | Analysis task: Bezier curves p105 (hand in after hols) |
|  | Review | mymathsonline | Chapter review |
|  | END OF TERM 1 |  |  |
| **3 weeks**  **15 Apr-3 May** | CUBICS AND QUARTICS |  | Assignment:  4 parts – 2 at home, 2 in class (1 period) |
|  | Long division of cubics | 3.1 Q5,10, 11, 12 | HW 3.1 Q18 |
|  | Remainder and factor theorem | 3.2 | HW 3.2 Q16 |
|  | Sum and difference of two cubes | 3.3 | HW 3.3 Q5 |
|  | Solving cubic and quartic equations | 3.4 | HW 3.4 Q11 |
|  | Cubic/quartic graphs – intercept method | 3.5 | HW 3.5 Q11,13 |
|  | Cubic/quartic graphs - y = a(x-h)3(4) + k | 3.6 | HW 3.6 Q7 |
|  | Domain and range | 3.7 |  |
|  | Polynomial models (matrices and/or regression models) | 3.8 | HW 3.8 Q9 |
|  | Review |  | Chapter review |
| **3 weeks** | FUNCTIONS/RELATIONS & TRANSFORMATIONS |  | Test:  1 period  Multiple choice |
|  | Rectangular hyperbolae and truncus | 4.1 |
|  | The square root function | 4.2 | Gallery of graphs task |
|  | Circles and semi-circles | 4.3 |  |
|  | Hybrid functions (mix of all fns, domain and range) |  |  |
|  | Transformations of functions – pulling it altogether |  | SAC analysis task p188 |
|  | Modelling |  |  |
|  | Review |  |  |
| **4 weeks** | CIRCULAR FUNCTIONS |  | Test:  1 period  No technology |
|  | Trigonometric ratios | 7.1 | Application task:  Tasmania Jones |
|  | Degrees and radians | 7.2 |  |
|  | Exact values | 7.3 |  |
|  | Unit circle - symmetry properties | 7.4 | Speed test on unit circle |
|  | Graphs of sine and cosine functions:   * Period, amplitude, average value * Dilations * Translations | 7.5, 7.6 | HW 7.5 Q8. 7.6 Q5 |
|  | Solving trig equations | 7.9 | HW 7.9 Q6-8 |
|  | The Pythagorean Identity | 7.8 |  |
|  | Graphs of tangent functions | 7.7 |  |
|  | Trigonometric models | 7.10 |  |
|  | Review |  | Chapter review |
|  | END OF SEMESTER |  |  |
|  | X |  |  |
|  | X |  |  |
|  | X |  |  |
|  | END OF SEMESTER |  |  |